ME – 4

DEVELOPMENT AND EFFECT OF MULTIMEDIA LEARNING ARITHMETIC TO IMPROVE ELEMENTARY STUDENTS' MATHEMATICAL ABILITIES

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Abstrak

The second phase of this research is develop and measure multimedia learning arithmetic to improve elementary students' mathematical abilities based on the results of the first phase of the study. Multimedia learning arithmetic made, conducted using 10 indicators that is communicative, creative, simple, unity, the depiction of objects in the form of a representative image, the selection of the appropriate color, typography, layout, moving visual elements, and navigation. Barriers in developing multimedia learning arithmetic is collective bargaining entire team to create and measure multimedia is in the process of realizing a multimedia representative; find professionals who are willing to make a multimedia learning arithmetic representative; practical power of multimedia learning arithmetic makers who understand the character of elementary school students in learning arithmetic. Nevertheless multimedia learning arithmetic can improve elementary students' mathematical ability, and better than the learning outcomes of students who are learning without the use of multimedia learning arithmetic.

Keywords: Multimedia, Arithmetic

INTRODUCTION

Media representative to learn math, helping students understand the material being studied. There is little media learning mathematics in the form of media (multimedia). Multimedia learning math can be had by buying in bookstores and on the internet to download. Multimedia in question is the medium used to convey the message through many intermediaries such as text, voice (audio), pictures (visual). In other words multimedia can play and show the object of study is not static but representative.

Multimedia learning facilities suspected to have contributed better than any other medium. It is based on the statement Dwyer F.M. (1978), that the success of learning by hearing 11% and 83% through sight. Because it is not impossible, success in learning through hearing and seeing at the same time would be better than just hearing or seeing it.

Based on the results of research in the first year, it was found that in general the quality of multimedia learning mathematics still needs to be improved. Especially multimedia learning arithmetic for elementary students, and completing the necessary repair materials content. Similarly, the audio and visual content needs improvement and suitability of the content of audio and visual content and multimedia user character (elementary school students) (Karlimah: 2013). These conditions are contained in the multimedia learning arithmetic from class I to start sixth grade.

Based on the results of the first stage of research, multimedia can be used as a starting point to develop a multimedia learning arithmetic for elementary students that multimedia learning arithmetic product of PT / CV Elex Media Komputindo.

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This determination is based on the measurement results of the 30 pieces of multimedia products using a variety of multimedia learning arithmetic instrument valid and reliable. The results of the first phase of the study showed that multimedia products of PT / CV Elex Media is a multimedia Komputindo its better quality than the products of other multimedia learning arithmetic.

The findings of the first phase of the study, led researchers to develop multimedia learning arithmetic for elementary students. Therefore further research related to the development of multimedia learning arithmetic for elementary students. Multimedia learning arithmetic is made such that it is suitable for elementary students learn arithmetic. Multimedia is a multimedia it should contain the contents / materials arithmetic systematic and conceptually and procedurally complete and supported by audio and visual components suitable for elementary students learn arithmetic.

Based on the results of the first phase of research, which has resulted in instruments / measuring devices are representative of multimedia learning arithmetic for elementary students. Furthermore, the second phase of this study used the instrument / measurement tool as a guide to design and create a multimedia learning arithmetic for elementary students. Design and create a multimedia learning process for students from elementary arithmetic necessary actions carefully through the preparation and implementation of the research and development of multimedia learning arithmetic for elementary school students.

The focus of the second phase of this study is: "Developing multimedia learning arithmetic can enhance the ability of elementary school students 'mathematical'. Next is to determine: 1). What are the obstacles in developing multimedia learning arithmetic for elementary students ?; 2) How does the use of student learning outcomes and use of multimedia learning arithmetic?

METHODS

he method used is the method of research and development. A method that can lead to yield a representative multimedia learning arithmetic, and results from the use of multimedia in question. This method is implemented by starting designing and creating multimedia learning arithmetic for elementary students based on criteria that have been found from the results of the first phase of the study, validated, and tested to the elementary students (Sugiyono: 2010). Shape design of trials / experiments are non-equivalent control group as follows.

$$\begin{array}{ccc} \mathbf{O_1} & \mathbf{x_1} & \mathbf{O_2} \\ \mathbf{O_1} & \mathbf{x_2} & \mathbf{O_2} \\ \mathbf{O_1} & \mathbf{x_3} & \mathbf{O_2} \end{array}$$

Remaks:
$\mathbf{O_1}$: pretest
$\mathbf{O_2}$: postest
$\mathbf{x_1}$ **,** $\mathbf{x_2}$, $\mathbf{x_3}$ **:** treatment of learning by using multimedia (audio-visual animation)

In addition to data collection mathematical abilities of students through the pretest and postest, also distributed a questionnaire to collect data on the quality of multimedia learning arithmetic by teachers and parents.

RESULTS AND DISCUSSION

Develop multimedia learning arithmetic representative, carried out through the following activities: (1) establish goals and mathematical competence in accordance with the latest curriculum (Basic Framework and Curriculum Structure 2013), which needs to be achieved by students; (2) determine the selection of the proper objects or characters to use in multimedia learning arithmetic, so as to attract the attention of students as well as provide clarity observed object can motivate students and student learning, (3) make improvements and equipment of the content (materials arithmetic) for students to learn , taking into account the

grain material in accordance with experience / student world; (4) create a match between the audio and visual of the content material.

Testing multimedia learning arithmetic implemented an experimental method; and evaluate the appropriateness, efficiency and effectiveness in the learning multimedia learning arithmetic. This was done to know the reality of multimedia applications that have been made have been able to convey concepts / materials that have been carefully designed by the team supported by the language selection, pictures (visual) and sound (audio) or not.

Multimedia learning arithmetic can enhance the mathematical abilities of elementary school students must show indications: 1) Communicative. Visualization supports the teaching materials to be easily digested by the students. Using things that are of interest / preferred by the target associated with visual (icons, signs, pictures and other visual elements). Taking into account visual signs are easy and convenient to see and read. Expand the image (animation) that are relevant to each item of discussion. 2) Creative. Visualization is presented in a unique and not cliche or frequently used. Explanation of messages systematically compiled information. Audio uses music and narration that encourage and generate curiosity. 3) Simple. Visualization is not complicated and does not reduce the clarity of the teaching materials to be easily understood. Contains simple and interesting content. 4) Unity. Using a visual language that is harmonious, intact, and thus matching teaching materials is perceived as a whole and comprehensive, interesting and communicative, in a meaningful unity. 5) The description of the object in the form of a representative image. Using pictures that can give you the things that need to be delivered by the material and in accordance with the reasoning abilities of students. 6) Selection of the appropriate color. The use of color should support compatibility between concepts and topics are selected and multimedia users (elementary school students). 7) Using the principles of typography: Writing Readable, Legible, and Clarity is legible, and can be easily / clearly readable and convenient / readable by elementary students. 8) Pay attention to the layout (lay-out). The layout should provide convenience and interest in learning the material. 9) Using visual elements moving (animated). Animation used can simulate teaching materials, aims to illustrate the material significantly. 10) Navigation (Icon) must be known and consistent so happens effectiveness in the use of multimedia. Icon serves as a sign for the execution direction / desired destination. Icon designed a simple, character, and interesting because of its function as a guide.

The process of developing multimedia learning arithmetic to improve mathematical ability in elementary school students have a bottleneck in: 1) The opportunity to meet and confer in making and measuring multimedia in the process of realizing multimedia representative. 2) The willingness of professionals to create multimedia learning arithmetic representative. 3) Power practical as auxiliary power in making multimedia learning arithmetic who understand the character of elementary school students in learning arithmetic.

Research shows mathematical abilities before learning experience without the use of multimedia learning arithmetic average values obtained were 4.06. Obtaining students initial value is dominated by the value 4.67. The highest value of 8.33 and the lowest value of 0.26. Obtaining this value indicates that the ability of early mathematical learning of students who will obtain without the use of multimedia learning arithmetic including the low category. Average values obtained final mathematical abilities after learning without the use of multimedia learning arithmetic is 4.83. That many students value obtained is 4.67. The highest value of 9.67 and the lowest value of 0.67. Acquisition value after learning without the use of multimedia learning arithmetic shows that the student has the ability to lower end of the mathematical category, although there was an increase.

Early mathematical ability of students who are taught using multimedia learning arithmetic average values obtained 4.13. Obtaining students initial value is dominated by the value of 2.67. The highest value is 9.67 and the lowest value of 0.33. Obtaining this value indicates that the initial mathematical ability of students who will acquire the learning of mathematics with the help of multimedia learning arithmetic including the low category. The average value of the final mathematical abilities after learning by using multimedia learning arithmetic is 5.78. Dominant value that occurs after learning without the use of multimedia learning arithmetic is 4.00. The highest value is 9.67 and the lowest value of 2.33. Acquisition

value after learning by using multimedia learning arithmetic shows students' mathematical abilities end there though very small increase, as well as the acquired ability is still categorized as low.

It was found that the mathematical ability of students who experience learning by using multimedia learning arithmetic showed an average increase of 0.27. The highest increase experienced by students learning by using multimedia is 0.92 while the lowest decrease of 0.64. In the study group carried out without the use of multimedia, showed an average increase of 0.08. The highest increase of 0.95 while the lowest decline by 1.00.

Based on the test results of students' initial ability differences statistically, demonstrating the significant value of two parties (Sig.2-tailed) is 0.761. The significance value is greater than α (0.05), so it is accepted and Ha rejected. Thus there is no group differences in initial ability students will learn to use multimedia and groups of students who will learn without the use of multimedia. After learning, each group was significant for the two different test values (Sig.2-tailed) is 0.761. This value is greater than 0.05 so that the testing criteria, rejected and Ha accepted. This indicates that there are differences in the ability of the end groups of students learning with multimedia and a group of students who learn without using multimedia. Based on the results of testing students' ability to change the difference in statistics, shows that the t value 2.807> t table 1,96 so that Ho is rejected and Ha accepted. This suggests that there are differences in the ability of students studying changes by using multimedia learning arithmetic with students who learn without using multimedia learning arithmetic.

CONCLUSION

Multimedia learning arithmetic made based indicators: 1) Communicative, 2) Creative, 3) Simple, 4) Unity, 5) The description of the object in the form of a representative image, 6) Selection of the appropriate color, 7) Typography, 8) layout, 9) element of visual motion, and 10) Navigation.

In developing multimedia learning arithmetic to improve mathematical ability in elementary students required the willingness of experts to develop materials arithmetic, determine the image to mevisualisasikan material, and music and voice are appropriate and suitable for elementary school students with a curriculum that is applicable. Minimize difficulties in meeting and conferring in the creation and measurement of multimedia in the process of realizing multimedia representative. Not difficult to find professionals who are willing to make a multimedia learning arithmetic representative. Practical force as auxiliary power in making multimedia learning arithmetic who understand the character of elementary school students in learning arithmetic.

Students who are learning arithmetic by using multimedia learning arithmetic are designed and manufactured with the provisions of the implementation of the 10 indicators showed the average value is 5.78. Students who are learning arithmetic without the use of multimedia learning arithmetic shows the average value is 4.83. Although the acquisition of learning outcomes is still low, but after a statistical test showed that the learning outcomes of students who use multimedia learning arithmetic is significantly better than the students who are learning arithmetic without the use of multimedia learning arithmetic.

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